

Cost-Effective Powder Metallurgy TiAl-Based Components For Aerospace Use, Phase I

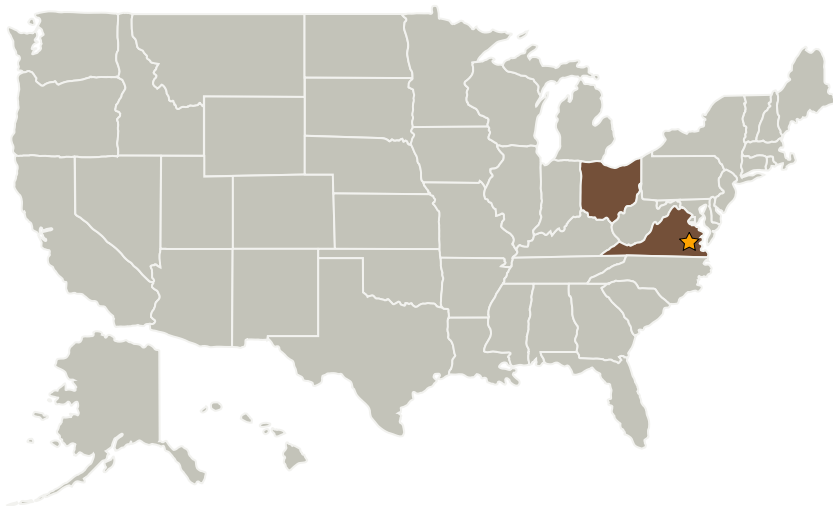
Completed Technology Project (2004 - 2004)



Project Introduction

Gamma titanium aluminide (TiAl) alloys with their low density ($\sim 3.9\text{g/cm}^3$), good elevated temperature strength, stiffness, creep resistance and acceptable burn and oxidation resistance have excellent potential for use in high temperature aerospace applications at temperatures between 500oC to 1000oC instead of the currently used high density ($\sim 8.9\text{g/cm}^3$) Ni-based superalloys. However, its poor intermediate and room temperature ductility cause conventional manufacturing operations such as rolling, forging or drawing to be difficult for titanium aluminides, thus leading to very high cost of TiAl components (currently up to \$10,000 per 30" by 12" by 0.04" sheet from an offshore source, Plansee in Austria). In the proposed program cost-effective flat products (sheet/foil) and NNS "chunky" components of monolithic TiAl and composites concepts (TiAl/Ti high-temp alloy/TiAl, TiAl/Ti3Al/TiAl, and TiAl/ceramic concepts) will be fabricated by a patented loose sintering approach. This low cost approach, which allows flexibility in gauge product, a hot pressing approach, microstructure and mechanical properties of the products as well as formability and joining/diffusion bonding capabilities will be evaluated with the goal of achieving the requirements for structural use. These components can be used in next generation launch vehicle airframe (experiencing extensive aerodynamic heating) and engine applications.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Advanced Materials Products Inc	Supporting Organization	Industry	Hudson, Ohio

Primary U.S. Work Locations

Ohio	Virginia
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Vladimir S Moxson

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.8 Smart Materials